

International Mobility to Support Innovation in Eastern Europe: Estonia, a Case Study

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Abstract—Human capital has become a central element in the innovation debate, but in the discourse on international mobility, Eastern European “catching-up countries” are usually afflicted with a brain drain that is inconsistent with their economic development. The case study of Estonia shows that to raise the competitive edge of companies, it is critical to embed internationally renowned and networked specialists. Migration policy must also be a part of innovation policies in the catching-up regions of Eastern Europe.

I. INTRODUCTION

Innovation—defined as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” [1]—forms a foundation, probably the most important one, of economic development in any economy. Innovations are usually based on some type or form of skills and knowledge (not necessarily in a codified form; for instance, experience, networks, etc., often involve tacit knowledge) to gain a competitive advantage. Having a shortage of staff for innovation, defined as skilled people with at least tertiary education in fields relevant to innovation (such as engineering, industrial research, design, innovation management), can be a considerable bottleneck in innovation and economic development, but this shortage can be mitigated via international mobility—migration of workers.

This study analyzes from an international mobility perspective the shortage of innovation staff in companies that form the core of the Estonian innovation system. Although Estonia is used as a case study, the finding can be generalized to other Eastern European (EE) countries¹ as they form a rather coherent set of countries with regard to research and development (R&D) and innovation [e.g., 2].

Previous research identified various indicators emblematic of the Estonian enterprise sector, and a sample was drawn of the companies that are central to the Estonian innovation system. After interviewing entrepreneurs, innovation researchers, and other innovation-system actors in 2007 and 2008 (altogether 30 interviews), crucial skill gaps were

identified and linked to typologies of Estonian companies. These earlier results, published as [3], outlined a set of schemes for promoting recruitment and mobility of innovation staff that were believed to have a strong potential to address the needs of Estonian industry. This follow-up research, however, focuses in-depth on international labor mobility as a possible tool to support innovation in EE countries.

Innovation activities and international mobility as a theoretical framework are proposed in section two. Section three discusses the Estonian enterprise sector from the perspective of R&D and innovation capacities, demand for and supply of innovation staff, and respective policy recommendations regarding international mobility.

II. INTERNATIONAL MOBILITY AND INNOVATION

Reinert argues [4], “No one disagrees that new knowledge is the main factor in increases in our standard of living. Disagreement starts when this process has to be modeled.” The exogenous growth model, a model of long-run economic growth, as introduced by Solow [5], was based on two key factors of production: physical capital and (unskilled) labor. In the 1960s, other economists already dissatisfied with Solow's explanation worked to “endogenize” technology (and human capital behind that), but the literature on neoclassical models of endogenous technology started to grow rapidly only following the publication of Romer [6] in 1986. In these econometric approaches, attempts were made to model R&D processes and technological advancement; externalities and spillovers as well as knowledge obtained particular importance. Although there have been numerous attempts, models developed are still too restrictive since the innovation process is far more complex (for critical analysis on entrepreneurial function in these models, see, e.g., [7]). Neoclassical growth models have also been heavily criticized due to their inappropriate assumptions and methods [e.g., 4, 8, 9], resulting in neoclassical growth models shifting towards Schumpeterian evolutionary economics [10].

Evolutionary economics places entrepreneurship and human capital in the very center of economic development. Firms are best served by a competency-based model, where skills and tacit knowledge (individual or team competencies) are fostered and maintained. Examples include the “firm as repository of knowledge” [11] and “the dynamic capabilities

¹ In the context of this article, Eastern European countries are the following ten most-recent member states of the European Union: Bulgaria, the Czech Republic, Hungary, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The term “catching-up countries” is also used in this context.

of firms” [12], which focus on the capability to build internal competencies in a dynamic environment. Drucker observed the rise of “knowledge workers” in the 1960s, arguing “a company that is not able to attract, motivate, and hold men of talent and competence will not survive” [13]. An excellent account on how innovation processes take place and how different competencies—including technical, managerial, etc.—have to exist on company level is available in [14].

In addition, external sources of scientific, technical, and market information have always been important for innovation processes. As outlined in [15], the most important characteristics that play an essential role for the success or failure of innovations as identified in this project are user needs and networks; coupling of development, production, and marketing activities; linkage with external sources of scientific and technical information and advice; concentration of high quality R&D resources on the innovative project; the high status, broad experience, and seniority of the “business innovator”; and basic research. Since 2003 the “open innovation” concept—“the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively” [16]—has gained a lot of popularity among company managers as well as innovation researchers and policy analysts [e.g., 17].

The kind of knowledge a business needs to advance innovation is dependant on the level of development of the national innovation system, the industrial sector the business is in, and the company itself. Lundvall has written seminal works on how users and producers of innovations are mutually interdependent in complex ways [e.g., 18]. This interdependence is central to the “doing, using, and interacting mode of innovation,” an experience-based mode of learning, while the use of codified scientific and technical knowledge is central to the “science, technology, and innovation mode of innovation” [19]. It is widely acknowledged that acquisition, adoption, and dissemination of existing knowledge may be relevant for most enterprises in countries behind the technological frontier.

For innovation processes to succeed, different competencies have to exist on a company level, including technical, managerial, and marketing. In order to succeed commercially, R&D activities must be supported with market research, manufacturing start-up, acquisition of additional knowledge, and technology. In today’s world, companies must have knowledge on global markets to succeed in them; for successful technology transfer, companies need competencies on various technologies, etc. Because much knowledge tends to be tacit, the capabilities of many companies in these crucial areas might be limited. National labor mobility can overcome these limitations and contribute to knowledge transfer and spillovers [e.g., 20].

Since missing competencies might not be available on a national level, in many circumstances gaps can be filled in via international labor mobility. Although the concept of international mobility entered the migration literature in the 1960s and focused primarily on the perceived losses of highly

skilled workers from Europe (the “brain drain”), the importance of international mobility for skilled labor was noticed much earlier. Reinert argues [21], “The importance of foreign immigration—particularly through the skills that they bring in—is a constant theme starting already in the Byzantine Empire and in Xenophon’s *Poroi*.” International migration has been used by many countries (especially Holland and England) for their benefit. Conversely, the Venetian Republic prohibited the migration of skilled workers under the threat of death penalty [22].

The worldwide competition for skilled workers has increased in recent years; finding skilled foreign workers is already difficult in such fields as health care, the sciences, and information and communications technology. This challenge will only become more acute [23, 24]. Mahroum recognizes migration as an “inseparable segment of national technology and economic development policies” [25].

International mobility has indeed emerged as a policy agenda item. Although Europe lags behind North America in attracting highly skilled migrants [24], most OECD (Organisation for Economic Co-operation and Development) countries have programs to facilitate the entry of highly skilled migrants [26]. The European Commission’s Policy Plan on Legal Migration [27] also includes a legislative proposal for the management of entry and residence of highly skilled workers. The OECD even suggests forgetting the “old” immigration system and focusing, instead, on the emerging system of international labor mobility: “Governments, under the new system, cannot remain captive to the now unproductive debate about whether or not to open immigration to skilled or unskilled workers (the era of rhetorical goals of zero immigration is now past). They must forge policy conversations with all relevant stakeholders (e.g. employer associations, unions, migrants’ organisations and local governments) about the workers needed in the economy and that the society is prepared to accept, treat properly and integrate effectively” [28]. Conversely, developing countries are usually afflicted instead with a brain drain. The OECD describes the outflow of highly skilled workers as being detrimental to development: “Ironically, low-income countries tend to participate in the emerging global mobility system in ways inconsistent with poverty reduction” [29].

III. THE CASE OF ESTONIA

Estonia, with a population of 1.4 million, is a Baltic economy in Northeast Europe. Estonia re-established political and economic independence from the Soviet Union in August 1991. Since then, Estonia has undergone strong liberalization of trade and capital markets. In order to allow technology transfer, the improvement of managerial skills, and more effective market competition, large-scale privatization was undertaken, and by 1995 most companies were privatized. Estonia has often been considered by many as one of the successful, if not the most successful, of the Eastern European catching-up economies [e.g., 30, 31], although concerns have been expressed by others [e.g., 32,

33]. Today, however, it is widely acknowledged that the Estonian enterprise sector has difficulties. One of the main problems is seen by many to be the mismatch between R&D and education system on the one hand and industry needs on the other.

A. Estonian Innovation System

Firms are central to innovation systems in any country. Previous research and interviews resulted in the following three divisions (type a, b, and c) of Estonian companies, based on their R&D and innovation intensities.

Various experts claim Estonia has about fifty world-class or close to world-class research-intensive (type a) companies. According to data from the Archimedes Foundation, from 2002 through 2006, forty-three companies have successfully co-ordinated or partnered in R&D projects funded by the European Union Framework Programme [34]. Type-a companies belong mostly to the following sectors: information and communication technology, electronics, biotechnology, energy, environment, nanotechnologies, and to the chemical industry in general.

The number of internationally competitive companies with limited research but strong development capacity (type b) is estimated to be from 150 to 200. For example, according to Statistics Estonia the number of companies that have more than nine employees and report R&D expenditures is 204 [35]. According to the Community Innovation Survey 4 (CIS4), thirty-nine companies with R&D costs between 5%–10% of turnover and an additional ninety-nine companies with R&D costs up to 5% of turnover are co-operating with R&D institutions [36]. There were eighty-nine companies that submitted application for FP6 funding (6th Framework Funding Programme of the European Union) but were not successful [34]. Type-b companies belong mostly to the following sectors: information and communications technology, financial intermediation, electronics, chemical industry, manufacture of transport equipment, dairy industry, manufacture of metal as well as nonmetallic mineral products.

The number of competitive (growing firms) with limited development and no research capacity (type c) can be assumed to number about 1,500. According to CIS4, the number of exporting innovative companies with more than ten employees (2002–2004) is 1,342 [36]. In addition, there are companies that are currently focused on the Estonian market but are about to break through to the world market, thus enlarging the group by some 150 companies. Such innovative and exporting companies can be found in all economic sectors (for a detailed overview of the innovation performance of various economic sectors see [37]).

In sum, the number of enterprises that are at the center of Estonian innovation is small—less than 2,000 enterprises. Their activities, including networking with each other as well as with public and nonprofit research institutions determines how the Estonian innovation system progresses and contributes to general economic development. From the perspective of R&D and innovation, it is most important to

focus on the further development of these companies. As argued previously, innovation staff is of utmost importance.

B. Demand for Innovation Staff

The results of the CIS4 reveal that in the manufacturing industry among factors obstructing innovation, “lack of competent personnel” jumped from 5th place in 1998–2000 to 2nd place in 2002–2004 [37].

Another survey conducted among 810 companies in 2005 concluded that the primary development obstacle was related to the financing of innovations. This was followed by difficulties in finding sufficient labor as well as insufficient access to markets. When comparing measures where the involvement of the state was most anticipated, the largest number of entrepreneurs specified the weakness of education and practical training and the need to develop each one [38].

Many sectoral studies reach similar results. For example, companies in ICT frequently mention that they cannot find the type of people in the labor market that they would like to employ. The problems noted are lack of experience as well as the required level of expertise and motivation of employees: “people who have acquired higher education need from a couple of months to a year before they meet the requirements and interests of companies and on the other hand, the knowledge and skill base of experienced people is relatively low, making it a starting point from which it is hard to strongly and rapidly move toward R&D activities” [39].

The labor problem is critical for companies that undertake R&D projects. An impact evaluation of the R&D financing program run by Enterprise Estonia studied projects that were granted funding in 2001–2004. Many reasons were given for a project failing to have an economic impact. Many beneficiaries reported that human-capital-related issues were the main factors that inhibited the successful conduct of the project; sometimes a lack of scientific and technological skills was revealed, but the most inhibiting factor for economic impact was a lack of skills related to successful management and marketing [40].

In sum, world-class, research-intensive (type a) companies need senior (top-level) researchers and marketing specialists who must have excellent technical knowledge about research-intensive products, services, and processes. Internationally competitive companies with limited research but strong development capacity (type b) need internationally experienced managers, people with product- and technology-management competence. Those with limited development and no research capacity (type c) need internationally experienced managers, engineers, designers, innovation managers, international sales, and other specialists. Eurostat reports that the problem is probably getting even more acute, “Estonia could be seen as having the oldest tertiary educated population as more than 42%, (around 113,000) of their human resources in science and technology population, are between 45–64 years old” [41].

In recent years, increasing numbers of authors have started to consider “business model innovation” [e.g., 16] as a separate type of innovation. Although it is reflected under

organizational innovation in the widely popular OECD innovation measurement guidebook [1], those authors see that the central concept in business development is business-model innovation, which results in an entirely differently type of company that competes not only on the value proposition of its offerings but also aligns its profit formula, resources, and processes to enhance that value proposition, capture new market segments, and alienate competitors. A lot of missing competencies are related to moving from simple business models (companies that compete on price and sell commodities and do not undertake much R&D) towards more innovation and technology-intensive models where human capital and entering into global knowledge and production networks are crucial.

C. Supply of Innovation Staff

The problems related to the supply of innovation staff in Estonia have manifold reasons and can be characterized both in quantitative and qualitative dimensions.

Although Estonia is well known for having a high share of students participating in tertiary education [42], the higher education system has been criticized by many for having a relatively small proportion of students who could become innovation staff. Estonia is witnessing a quantitative gap between demand and supply caused by a low output of science, mathematics, computing, engineering, and manufacturing graduates for many years that has been below optimal levels, and although the output has grown recently, the increase is not big enough to close the gap [e.g., 43].

Perhaps even more important is the qualitative mismatch, confirmed by other studies [e.g., 39]. “The differential evolution of different types of organizations gave rise to farreaching mismatches in the overall system of innovation, with higher education institutions and surviving academy institutes providing education and research in a way that did not correspond to the actual needs of the Estonian economy and society” [43].

However, even if the number of new graduates suitable to become innovation staff continues to develop, this will not solve the problem of availability of experienced people in the short run. Fresh graduates cannot replace retiring innovation staff because they will need considerable on-the-job training before meeting the requirements and interests of companies.

Considering the ineffectiveness of the current education system to respond to changing needs in the short run, the gaps in the current innovation system, and the aging of a considerable share of innovation staff, issues concerning innovation staff shortages become more prominent than ever. Those shortages can be partially solved by encouraging additional international mobility.

D. Policy Recommendations

Immigration issues have generally received very little attention because Estonia continues to grapple with its past. The Estonian Migration Foundation explains, “As Estonia is still having major problems with the integration of Soviet period migrants, it is a widespread opinion that we first have

to solve the existing integration problems and only after that we can be more open for additional immigration” [44].

Although there are some mobility support schemes existing in Estonia [3], these are mainly directed towards supporting academic mobility or implementation of very R&D-intensive projects (thus supporting mainly type-a companies). A wider sample of companies are in need of additional innovation staff, yet their capacities to actually employ such highly skilled and expensive specialists are limited.

Implementing measures that encourage international mobility in developed countries requires mostly the removal of entry barriers as these countries are already attractive for highly skilled workers from other developed or, especially, developing countries. However, to encourage the flow of highly skilled workers to catch-up countries, additional incentives need to be provided. Many other countries, convinced of the benefits of labor migration, support their companies.

An example is the Transfer of Knowledge through Expatriate Nationals program that was started in Pakistan in 1980 with UNDP funds. Under this program, services of expatriate Pakistani experts are utilized to transfer modern know-how to the country through short-duration visits. Some costs have to be covered by host companies, while others are covered by the government and UNDP. Also, in 41 countries covered by the INNO-Policy TrendChart [45], there are sixty-six policy measures designed to “recruit innovators.” Support instruments for the recruitment of skilled people include provision of grants to enterprises to purchase external knowledge, covering of salaries, etc.

Considering that R&D and innovation activities are risky and costly, while there are positive spillovers to the whole society, it is recommended to encourage additional international mobility. For companies that have strong business plans showing how new expertise will contribute to their growth and profitability, a certain level of internationalization, certain financial stability in terms of turn-over and profits, and some R&D or considerable innovation activities, co-funding could be provided to cover direct personnel costs of additional innovation staff for a period of some years. Funding rates ought to be decrease during the three-year period, as gradually decreasing funding will put pressure on the company to realize the potentials of the expert. Additional incentives such as child care/education, spousal employment, and suitable housing should also be introduced.

IV. CONCLUSIONS

Human capital has become a central element in the innovation and economic development debate. The worldwide competition for innovation staff has also increased in recent years through various socio-economic effects, and migration policy is becoming part of innovation policy. However, in the discourse on international mobility, developing countries are usually afflicted with a brain drain

that is inconsistent with the development of the innovative capacities of companies.

The case study of Estonia, a typical Eastern European country, shows that it is critical to raise the competitive edge of Estonian companies via further product/process innovation and the application of modern business models. Companies need internationally renowned and networked specialists. Because innovation activities increase companies' capacities and spillovers, it is in the interest of national innovation systems to have missing competencies employed and respective support measures implemented.

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